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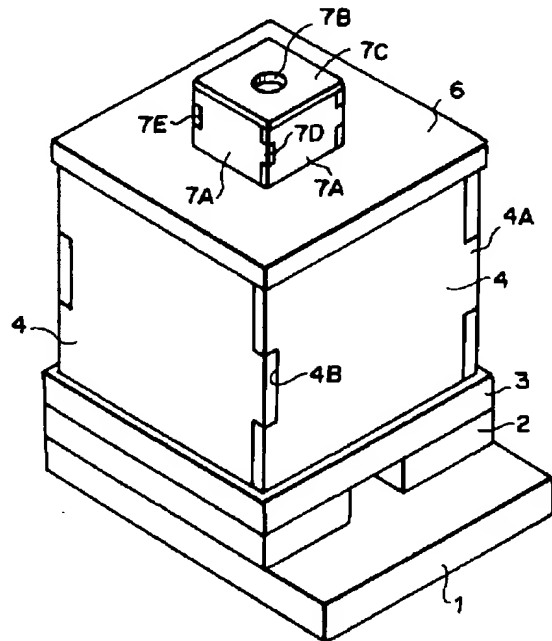
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(54) 【発明の名称】 組立式焼成炉

(57) 【要約】

【目的】 解体時にコンパクトで、組立てにフレキシビリティがあり、大きさに制約されことなく構成でき、しかも、断熱性に優れ、屋内でも簡単に組立てられ、陶器などの高温度の焼成が達成できる組立式焼成炉を提供する。

【構成】 偏平な炉台1と、バーナーノズル挿入口を有すると共に炉台1上に設置される火口部材2と、火口部材2の内部と連通する火炎導入口3Aを有すると共に火口部材2上に設置される偏平な炉床部材3と、炉体外周を炉床部材3上に組立・構成する複数の板状外壁部材4と、外壁部材4に対して所要の空隙を介して炉体内周を組立・構成するように炉床部材3上に設置される複数の板状内壁部材5と、天蓋を構成する排気孔6A付の偏平な炉蓋部材6と、炉蓋部材6上に設置されて排気孔6Aに連通する煙突部材7とより構成され、少なくとも上記内壁部材5は、セラミック繊維を成形した軽量耐火材で構成されている。



## 【特許請求の範囲】

【請求項1】 偏平な炉台と、バーナーノズル挿入口を有すると共に上記炉台上に設置される火口部材と、上記火口部材の内部と連通する火炎導入口を有すると共に上記火口部材上に設置される偏平な炉床部材と、炉体外周を上記炉床部材上に組立・構成する複数の板状外壁部材と、上記外壁部材に対して所要の空隙を介して炉体内周を組立・構成するように炉床部材上に設置される複数の板状内壁部材と、天蓋を構成する排気孔付の偏平な炉蓋部材と、上記炉蓋部材上に設置されて上記排気孔に連通する煙突部材とより構成され、少なくとも上記内壁部材は、セラミック繊維を成形した軽量耐火材で構成せられていることを特徴とする組立式焼成炉。

【請求項2】 上記炉床部材および炉蓋部材には、上記外壁部材および内壁部材の設置位置を規制する段差を形成していることを特徴とする請求項1に記載の組立式焼成炉。

【請求項3】 上記外壁部材および内壁部材は、それぞれ、組み合わされる隣接側縁に、互いに嵌合する突出部および嵌合溝を形成していることを特徴とする請求項1に記載の組立式焼成炉。

【請求項4】 上記炉床部材上には、火炎導入口から炉内への火炎の導入を妨げることがない状態で、耐火材よりなる焼成物用棚部材が設けられていることを特徴とする請求項1に記載の組立式焼成炉。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】本発明は、主として、屋内などで、小規模かつ簡易に、陶器などの焼成に使用する組立式焼成炉に関するものである。

## 【0002】

【従来の技術】この種の組立式の焼成炉は、軽量、簡便に組立できるだけでなく、分解して物置などに収納し、あるいは、搬送するのに便利で、かつ、小型化できることが重要である。また、炉内温度を効率的に高める必要から、十分な断熱性のある構造が要望されるが、素早い昇温と、断熱壁の厚さとは、互いに、二律背反の関係にある。即ち、一般の焼成炉は、必要とされる炉内温度を確保するために、かなり厚い炉壁を用意して、炉内外の温度勾配を維持する構造になっているので、熱容量が大きく、炉体の温度上昇に時間が掛かり、また、一方において、炉壁外面からの放熱量が、温度上昇に連れて大きくなるので、供給熱源が大型化する欠点がある。従って、このような構造を、そのまま、屋内で使用する組立式の焼成炉に採用することは、実質的に不可能である。

## 【0003】

【発明が解決しようとする課題】そこで、本発明者は、過去に、少なくとも、炉の外周と内周とを構成する炉壁を、中間に空隙を有する二重構造にした組立式焼成炉を提唱した。これに依って、飛躍的に断熱性が向上し、小

型ガスバーナー等で、所望の炉内温度を、素早く確保できるようにになった。

【0004】しかし、ここで採用した炉壁には、円筒などの筒状の構造部材を採用したので、使用しない場合の収納空間を、かなり占有することになり、また、搬送の際も、嵩張るという欠点がある。また、被焼成物が、長尺などの特異な形状の場合、これを収納するための十分な大きさの組立式焼成炉を用意しなければならない。

## 【0005】

10 【発明の目的】本発明は上記事情に基いてなされたもので、解体時にコンパクトで、組立てにフレキシビリティがあり、大きさに制約されることなく構成でき、しかも、断熱性に優れ、屋内でも簡単に組立てられ、陶器などの高温度の焼成が達成できる組立式焼成炉を提供しようとするものである。

## 【0006】

【課題を解決するための手段】このため、本発明では、偏平な炉台と、バーナーノズル挿入口を有すると共に上記炉台上に設置される火口部材と、上記火口部材の内部と連通する火炎導入口を有すると共に上記火口部材上に設置される偏平な炉床部材と、炉体外周を上記炉床部材上に組立・構成する複数の板状外壁部材と、上記外壁部材に対して所要の空隙を介して炉体内周を組立・構成するように炉床部材上に設置される複数の板状内壁部材と、天蓋を構成する排気孔付の偏平な炉蓋部材と、上記炉蓋部材上に設置されて上記排気孔に連通する煙突部材とより構成され、少なくとも上記内壁部材は、セラミック繊維を成形した軽量耐火材で構成せられている。

## 【0007】

30 【作用】これにより、解体した際には、炉を構成するほとんどの部材が、板状で、無駄空間を占有することなく、コンパクトに収納でき、搬送できる。また、組立ても、炉台の上に、各部材を単にビルト・アップするだけでよいから、素人にも簡単に組立てられ、複数セットを組み合わせて、大きさも選択でき、被焼成物の大きさ、形状に対しての適応性がある。また、少なくとも、炉体内空間を仕切る内壁部材を、セラミック繊維を成形した軽量耐火材により構成しているので、非常に熱容量が小さく、高熱化が容易であり、また、空隙を介して、外壁部材により、炉体の外周が構成されるから、断熱性が高く、比較的小型のガスバーナー等を用いても、素早い高温化が達成できる。

## 【0008】

40 【実施例】以下、本発明の一実施例を、図面を参照して、具体的に説明する。本発明に係る組立式焼成炉は、図1に示すように、ほぼ正方形の偏平な炉台1と、バーナーノズル挿入口を有すると共に炉台1上に設置される偏平な火口部材2と、火口部材の内部と連通する火炎導入口3Aを有すると共に火口部材2上に設置される炉床部材3と、炉体外周を炉床部材3上に組立・構成する複

数の、この実施例では、4枚の板状外壁部材4と、外壁部材4に対して所要の空隙を介して炉体内周を組立・構成するように炉床部材3上に設置される複数の、この実施例では、4枚の板状内壁部材5と、天蓋を構成する排気孔6A付の偏平な炉蓋部材6と、炉蓋部材6上に設置されて排気孔6Aに連通する煙突部材7とより構成されている。そして、少なくとも内壁部材5は、セラミック繊維を成形した薄い(例えば、25mm程度の厚さの)軽量耐火材で構成されている(なお、この実施例では、運搬、その他の取扱上の便宜から、全ての構成部材を、内壁部材と同じ材質の、軽量耐火材で構成している)。そして、内壁部材5で囲まれた炉内には、棚板13を介して、被焼成物が置かれる。

【0009】なお、この実施例では、火口部材2は、3個の直方体のブロックの組合せで構成されている。また、炉床部材3および炉蓋部材6には、外壁部材4および内壁部材5の設置位置を規制する段差3B、3Cおよび6B、6Cを、それぞれ形成している。また、外壁部材4および内壁部材5は、それぞれ、組み合わせられる隣接側縁に、互いに嵌合する突出部4A、5Aおよび嵌合溝4B、5Bを形成している。また、煙突部材7も、排気孔6Aを囲む4枚の板部材7Aと、排気孔7Bを備えた天蓋7Cとより構成されている。そして、これら板部材7Aの側縁にも、互いに嵌合する突出部7Dおよび嵌合溝7Eが形成されている。

【0010】これらの構成部材は、分解すると、いずれも、偏平な板状の物であるから、コンパクトに纏めることができ、物置などへの収納、運搬に便利である。また、組立でも、炉台1に対して、単に、積み上げ方式で、組立ができるから、専門的な炉の構築技術を必要としない。また、炉壁が、外壁部材4と、この内側に対して所要の空隙を介して配置される内壁部材5とで構成されており、更に、内壁部材5がセラミック繊維を成形した薄い軽量耐火材で構成され、熱容量が小さいので、断熱効果に優れ、また、所要の高温度(陶器の焼成には、通常、1,250℃)に、炉内を素早く昇温することができる。このため、プロパンガスなどの手軽な熱源を用い、これを、図示のように、ガスボンベ8からガスバーナー9に導いて、バーナー挿入口3Aにある、そのノズルから噴射し、燃焼させる程度の火力、熱エネルギーでも、火炎導入口3Aを介して、炉内に導かれた火炎により、十分に、陶器などの焼成を達成できるのである。

【0011】なお、図4および図5には、本発明の別の実施例が示されており、ここでは、2組のセットに、若干の追加部材を加えるだけで、横に長い、2倍容積の焼成炉を構成している。即ち、炉台1は、2個を横並びとし、その上に各部材を構築するが、1つの炉体が、追加部材の外壁部材10、内壁部材11および天蓋・炉底補助部材12を用いることで、各セットの2倍容積に構成される。

【0012】なお、上記実施例では、若干の追加部材を用いて、2倍容積の炉体を構成したが、本発明の焼成炉が、組立式である利点から、更に別の、あるいは、複雑な組合せなども、工夫できることは勿論である。

#### 【0013】

【発明の効果】本発明は、以上詳述したようになり、偏平な炉台と、バーナーノズル挿入口を有すると共に上記炉台上に設置される火口部材と、上記火口部材の内部と連通する火炎導入口を有すると共に上記火口部材上に設置される偏平な炉床部材と、炉体外周を上記炉床部材上に組立・構成する複数の板状外壁部材と、上記外壁部材に対して所要の空隙を介して炉体内周を組立・構成するように炉床部材上に設置される複数の板状内壁部材と、天蓋を構成する排気孔付の偏平な炉蓋部材と、上記炉蓋部材上に設置されて上記排気孔に連通する煙突部材とより構成され、少なくとも上記内壁部材は、セラミック繊維を成形した軽量耐火材で構成されているので、解体時にコンパクトで、組立てにフレキシビリティがあり、大きさに制約されることなく構成でき、しかも、断熱性に優れ、屋内でも簡単に組立てられ、陶器などの高温度の焼成が達成できるなどの効果が得られる。

#### 【図面の簡単な説明】

【図1】本発明の一実施例を示す斜視図である。

【図2】上記実施例の分解斜視図である。

【図3】上記実施例の縦断側面図である。

【図4】本発明の別の実施例の横断平面図である。

【図5】同じく、縦断正面図である。

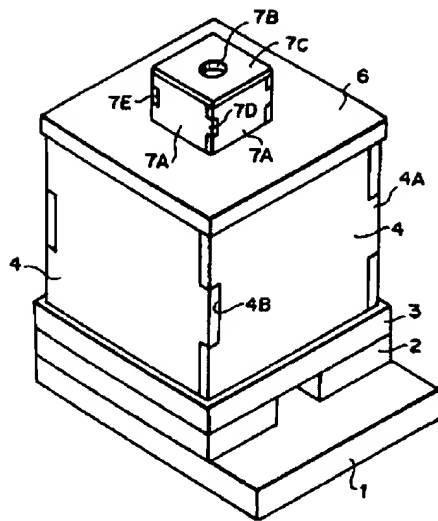
#### 【符号の説明】

1	炉台
2	火口部材
3	炉床部材
3A	火炎導入口
3B、3C	段差
4	外壁部材
4A	突出部
4B	嵌合溝
5	内壁部材
5A	突出部
5B	嵌合溝
6	炉蓋部材
6A	排気孔
6B、6C	段差
7	煙突部材
7A	板部材
7B	排気孔
7C	天蓋
7D	突出部
7E	嵌合溝
8	ガスボンベ
9	バーナー

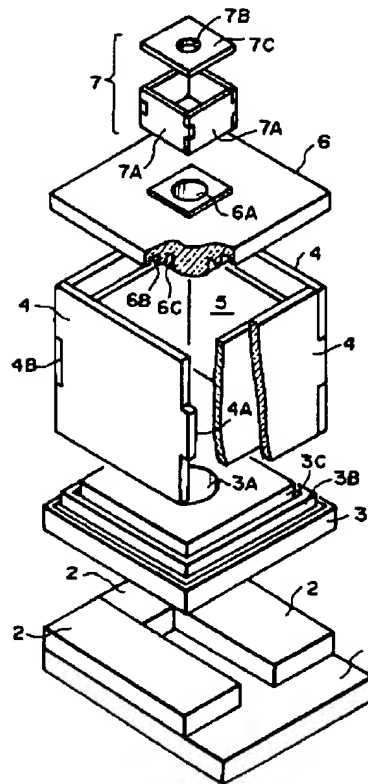
10 外壁部材  
11 内壁部材

12 炉床補助部材  
13 棚板

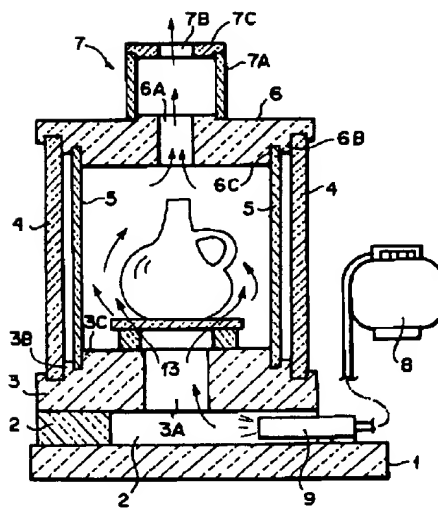
【図1】



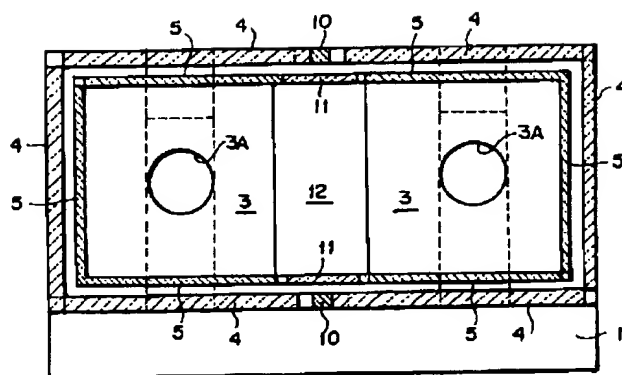
【図2】



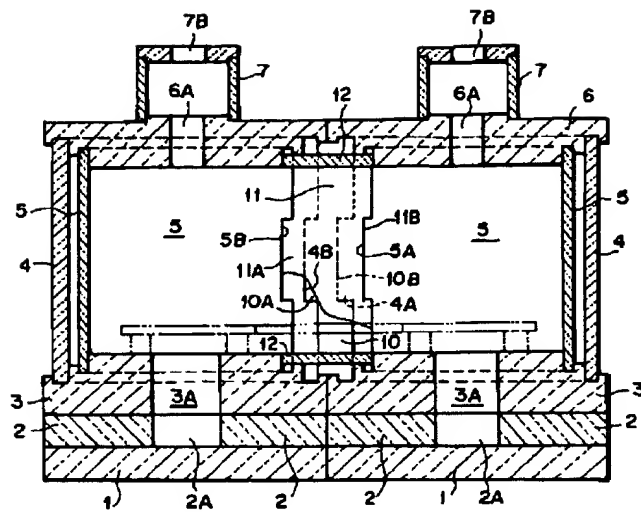
【図3】



【図4】



【図5】



CLIPPEDIMAGE= JP407004859A  
PAT-NO: JP407004859A  
DOCUMENT-IDENTIFIER: JP 07004859 A  
TITLE: BUILT-UP TYPE BAKING FURNACE

PUBN-DATE: January 10, 1995

INVENTOR-INFORMATION:  
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ASSIGNEE-INFORMATION:  
NAME COUNTRY  
YAMAGUCHI KIMIO N/A

APPL-NO: JP05316776  
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ABSTRACT:

PURPOSE: To make it compact in dismantled condition and flexible in assembling by a method wherein the title furnace is constituted of a flat hearth member, a plurality of sheet type outer wall members and sheet type inner wall members, a flat furnace lid member and a chimney member, provided on the furnace lid member, while the inner wall members are constituted of light-weight refractories, formed of ceramic fibers.

CONSTITUTION: Flat fire port members 2, provided on a furnace base 1, a hearth member 3, having a flame introducing port communicating with the interior of the fire port and provided on the fire port members 2, and a plurality of sheet type outer wall members 4, assembling and constituting the outer periphery of a furnace body on the hearth member 3, are provided. A plurality of sheet type inner wall members 5, provided on the hearth member 3 so as to assemble and constitute the inner periphery of the furnace body through a necessary air gap with respect to the outer wall member 4, are provided. Further, a flat furnace lid member 6, constituting a top lid and provided with an air discharging port, and a chimney member 7, provided on the furnace lid member 6 and communicating with an air discharging hole, are provided. In this case, at least the inner wall members 5 are constituted of thin and light-weight refractory members formed of ceramic fibers.

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# PATENT ABSTRACTS OF JAPAN

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(72)Inventor : YAMAGUCHI KIMIO

(30)Priority

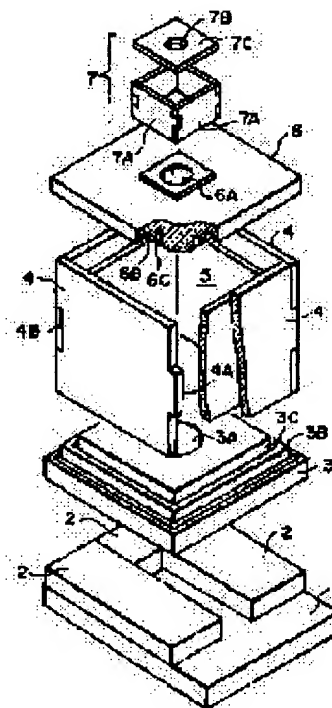
Priority number : 05130152 Priority date : 21.04.1993 Priority country : JP

## (54) BUILT-UP TYPE BAKING FURNACE

(57)Abstract:

PURPOSE: To make it compact in dismantled condition and flexible in assembling by a method wherein the title furnace is constituted of a flat hearth member, a plurality of sheet type outer wall members and sheet type inner wall members, a flat furnace lid member and a chimney member, provided on the furnace lid member, while the inner wall members are constituted of light-weight refractories, formed of ceramic fibers.

CONSTITUTION: Flat fire port members 2, provided on a furnace base 1, a hearth member 3, having a flame introducing port communicating with the interior of the fire port and provided on the fire port members 2, and a plurality of sheet type outer wall members 4, assembling and constituting the outer periphery of a furnace body on the hearth member 3, are provided. A plurality of sheet type inner wall members 5, provided on the hearth member 3 so as to assemble and constitute the inner periphery of the furnace body through a necessary air gap with respect to the outer wall member 4, are provided. Further, a flat furnace lid member 6, constituting a top lid and provided with an air discharging port, and a chimney member 7, provided on the furnace lid member 6 and communicating with an air discharging hole, are provided. In this case, at least the inner wall members 5 are constituted of thin and light-weight refractory members formed of ceramic fibers.



## LEGAL STATUS

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**PRIOR ART**

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[Prior art] The firing furnace of this kind of assembly formula is convenient to decompose, and to contain in a lumber room etc. or to convey it not only to be able to carry out assembly lightweight and simple, but, and it is important for it that it can miniaturize. Moreover, although the structure where there is sufficient adiathermancy from the need of raising the temperature in kiln efficiently is demanded, a quick temperature up and the thickness of an adiabatic wall are in the relation of an antinomy mutually. That is, since a quite thick furnace wall is prepared, heat capacity is large, the temperature rise of a furnace body takes time, since it has the structure of maintaining the temperature gradient of kiln inside and outside, and the heat release from the furnace wall superficies takes to a temperature rise and becomes large in one side in order to secure the temperature in kiln needed, a general firing furnace has the fault which a supply heat source large-sized-izes. Therefore, it is substantially impossible to adopt such structure as the firing furnace of the assembly formula used indoors as it is.

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EFFECT OF THE INVENTION

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[Effect of the invention] The nozzle component which came to have explained this invention in full detail above, and is installed on the above-mentioned \*\*\*\* while it has the burner nozzle insertion opening with \*\*\*\*\*, The \*\*\*\*\* hearth component installed on the above-mentioned nozzle component while it has the flame introduction opening which \*\*\*\*\* with the interior of the above-mentioned nozzle component, A furnace-body periphery on the above-mentioned hearth component Assembly and two or more tabular outer wall components to constitute, A necessary void is minded to the above-mentioned outer wall component. furnace-body inner circumference Assembly and two or more tabular wall components installed on a hearth component so that it may constitute, It consists of a \*\*\*\*\* door component with an exhaust hole which constitutes a canopy, and a stack component which is installed on the above-mentioned door component and \*\*\*\*\* to the above-mentioned exhaust hole. at least the above-mentioned wall component Are [ in the lightweight refractory material which fabricated the ceramic fiber ] compact at configuration \*\*\*\*\*'s at the time of dissection. A flexibility is in erection, it can constitute, without being restrained by the size, and moreover, it excels in adiathermancy, and also indoors is assembled simply, and the effect of being able to attain baking of high temperature, such as earthenware, is acquired.

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[Translation done.]

\* NOTICES \*

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TECHNICAL PROBLEM

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[Object of the Invention] Then, this invention person advocated at least the collapsible firing furnace which made the furnace wall which constitutes the periphery and inner circumference of kiln the dual structure which has a void in the interval in the past. Therefore, adiathermancy improves to this by leaps and bounds, and the desired temperature in kiln can be quickly secured to it now with a small gas burner etc.

[0004] However, since tubed structural members, such as a cylinder, were adopted, the receipt space in the case of not using it will be considerably occupied in the furnace wall adopted here, and there is a fault of being bulky in it, also in the case of conveyance. Moreover, in the case of unique configurations, such as a long picture, a calcinated object must prepare the collapsible firing furnace of sufficient size for containing this.

[0005]

[The purpose of invention] It was made based on the above-mentioned situation, and this invention is compact at the time of dissection, a flexibility is in erection, it can be constituted, without being restrained by the size, and moreover, it excels in adiathermancy, also indoors is assembled simply, and it tends to offer the collapsible firing furnace which can attain baking of high temperature, such as earthenware.

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**MEANS**

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[The means for solving a technical problem] For this reason, the nozzle component installed on the above-mentioned \*\*\*\* while it has the burner nozzle insertion opening with \*\*\*\*\* at this invention, The \*\*\*\*\* hearth component installed on the above-mentioned nozzle component while it has the flame introduction opening which \*\*\*\*s with the interior of the above-mentioned nozzle component, A furnace-body periphery on the above-mentioned hearth component Assembly and two or more tabular outer wall components to constitute, A necessary void is minded to the above-mentioned outer wall component. furnace-body inner circumference Assembly and two or more tabular wall components installed on a hearth component so that it may constitute, It is configuration \*\*\*\*\* with the lightweight refractory material with which it consists of a \*\*\*\*\* door component with an exhaust hole which constitutes a canopy, and a stack component which is installed on the above-mentioned door component and \*\*\*\*s to the above-mentioned exhaust hole, and the above-mentioned wall component fabricated the ceramic fiber at least.

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OPERATION

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[Operation] Thereby, when it disassembles, with tabular, without occupying useless space, almost all the components that constitute kiln can contain compactly, and can convey. Moreover, on \*\*\*\*, since erection should only just also carry out the built up of each part material, it is simply assembled also to an amateur, and can also choose a size combining two or more sets, and the adaptability to the size of a calcinated object and a configuration is. Moreover, quick elevated-temperature-ization can be attained, even if heat capacity is very small, high-temperature-izing is easy, and adiathermancy is high and uses a comparatively small gas burner etc., since the periphery of a furnace body is constituted by the outer wall component through a void, since the lightweight refractory material which fabricated the ceramic fiber constitutes at least the wall component into which the space in a furnace body is divided.

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[Translation done.]

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EXAMPLE

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[Example] Hereafter, one example of this invention is concretely explained with reference to a drawing. As shown in drawing 1, mostly the collapsible firing furnace concerning this invention Square \*\*\*\*\* 1, The \*\*\*\*\* nozzle component 2 installed on \*\*\*\* 1 while it has the burner nozzle insertion opening. The hearth component 3 installed on the nozzle component 2 while it has flame introduction opening 3A which \*\*\*\*\* with the interior of a nozzle component, and a furnace-body periphery on the hearth component 3 in assembly and two or more of these examples to constitute A necessary void is minded to the tabular outer wall component 4 of four sheets, and the outer wall component 4. furnace-body inner circumference in assembly and two or more of these examples installed on the hearth component 3 so that it may constitute It consists of a tabular wall component 5 of four sheets, a \*\*\*\*\* door component 6 with exhaust hole 6A which constitutes a canopy, and a stack component 7 which is installed on the door component 6 and \*\*\*\*\* to exhaust hole 6A. And the wall component 5 consists of a thin (for example, thickness of about 25mm) lightweight refractory material which fabricated the ceramic fiber at least (in addition in this example, the lightweight refractory material of the same quality of the material as a wall component constitutes all configuration components from the facilities on transport and the handling of others). And into the kiln surrounded by the wall component 5, a calcinated object is placed through a tray 13.

[0009] In addition, the nozzle component 2 is constituted from the combination of a block of three rectangular parallelepipeds by this example. Moreover, the level differences 3B and 3C which regulate the installation position of the outer wall component 4 and the wall component 5, and 6B and 6C are formed in the hearth component 3 and the door component 6, respectively. Moreover, the outer wall component 4 and the wall component 5 form the lobes 4A and 5A and the fitting slots 4B and 5B which carry out a fitting in the contiguity side edge put together, respectively. Moreover, the stack component 7 also consists of the four plates component 7A surrounding exhaust hole 6A, and canopy 7C equipped with exhaust hole 7B. And lobe 7D and fitting slot 7E which carry out a fitting mutually are formed also in the side edge of these plates component 7A.

[0010] If you decompose, since all are \*\*\*\*\* tabular objects, these configuration components can be collected compactly and they are convenient for the receipt to a lumber room etc., and transport. Moreover, since erection is also accumulated and is assembly ] only possible to \*\*\*\* 1 with a formula, construction technique of special kiln is not needed. Moreover, the furnace wall consists of an outer wall component 4 and a wall component 5 arranged through a necessary void to this inside, it consists of a thin lightweight refractory material with which the wall component 5 fabricated the ceramic fiber further, and heat capacity is excellent in adiabatic efficiency with the parvus's, and the temperature up of the inside of kiln can be quickly carried out to necessary high temperature (baking of earthenware usually 1,250 degrees C). For this reason, the flame which injects this from the nozzle which leads to a gas burner 9 from a chemical cylinder 8 like illustration, and is in burner insertion opening 3A, and was drawn in kiln through flame introduction opening 3A also with the heating power of the grade to burn and heat energy can fully attain baking of earthenware etc. using easy heat sources, such as a liquefied petroleum gas.

[0011] In addition, another example of this invention is shown in drawing 4 and drawing 5, and the long firing furnace of 2 double capacity only consists of adding some additional component to 2 sets of sets horizontally here. That is, although \*\*\*\* 1 makes two pieces a horizontal list and builds each part material on it, one furnace body is using the outer wall component 10 of an additional component, the wall component 11, and a canopy and a blast furnace bottom supplementary component 12, and it is constituted by 2 double capacity of each set.

[0012] In addition, although the furnace body of 2 double capacity was constituted from an above-mentioned example using some additional component, of course, the firing furnace of this invention can devise complicated combination etc. still independently from the advantage which is an assembly formula.

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**DESCRIPTION OF DRAWINGS**

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[An easy explanation of a drawing]

[ Drawing 1 ] It is the perspective diagram showing one example of this invention.

[ Drawing 2 ] It is the decomposition perspective diagram of the above-mentioned example.

[ Drawing 3 ] It is the vertical section side elevation of the above-mentioned example.

[ Drawing 4 ] It is the transection plan of another example of this invention.

[ Drawing 5 ] Similarly, it is vertical section front view.

[An explanation of a sign]

} \*\*\*\*

2 Nozzle Component

3 Hearth Component

3A Flame introduction opening

3B, 3C Level difference

4 Outer Wall Component

4A Lobe

4B Fitting slot

5 Wall Component

5A Lobe

5B Fitting slot

6 Door Component

6A Exhaust hole

6B, 6C Level difference

7 Stack Component

7A Plate component

7B Exhaust hole

7C Canopy

7D Lobe

7E Fitting slot

8 Chemical Cylinder

9 Burner

10 Outer Wall Component

11 Wall Component

12 Hearth Supplementary Component

13 Tray

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[Translation done.]

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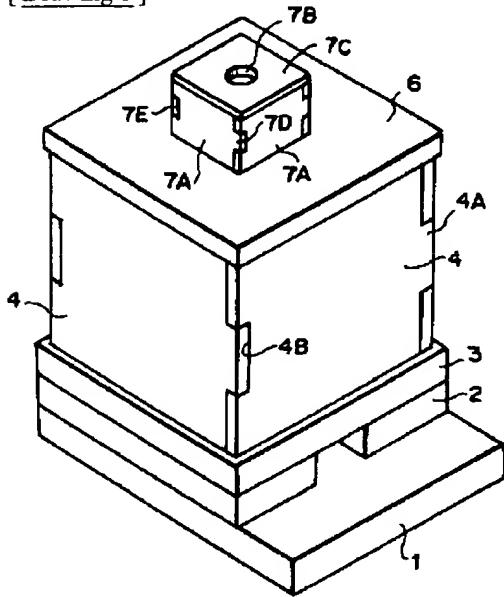
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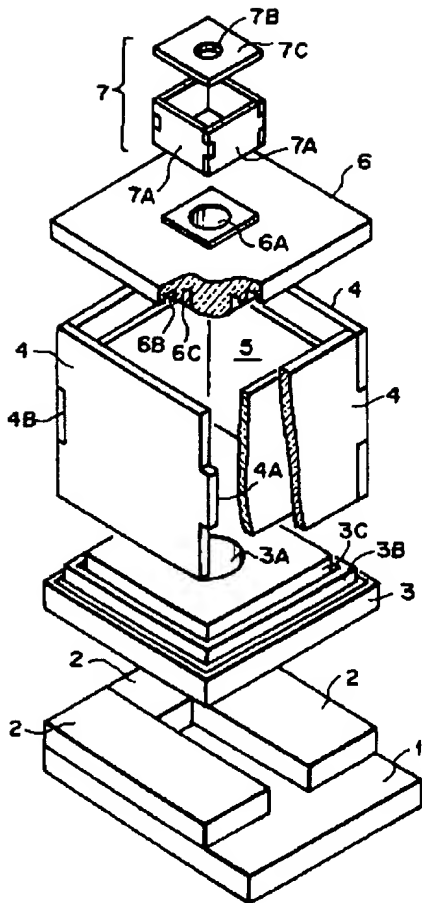
DRAWINGS

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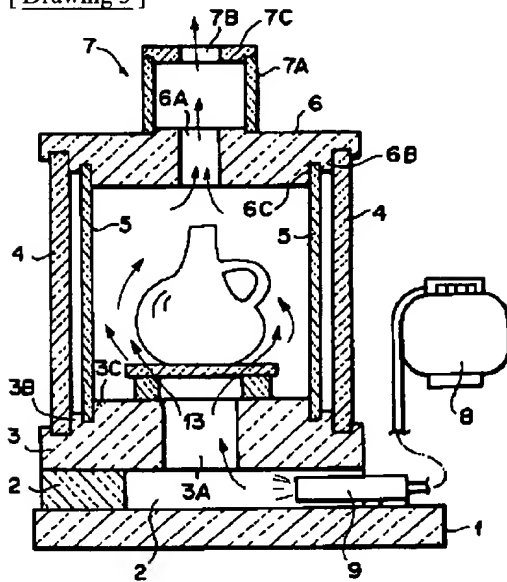
[ Drawing 1 ]



[ Drawing 2 ]

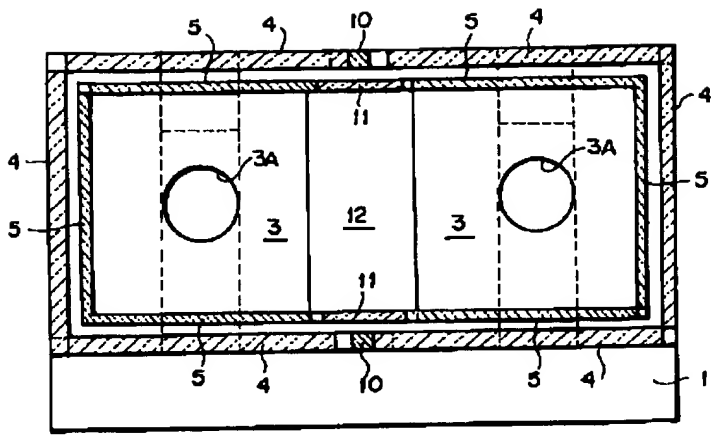


[ Drawing 3 ]

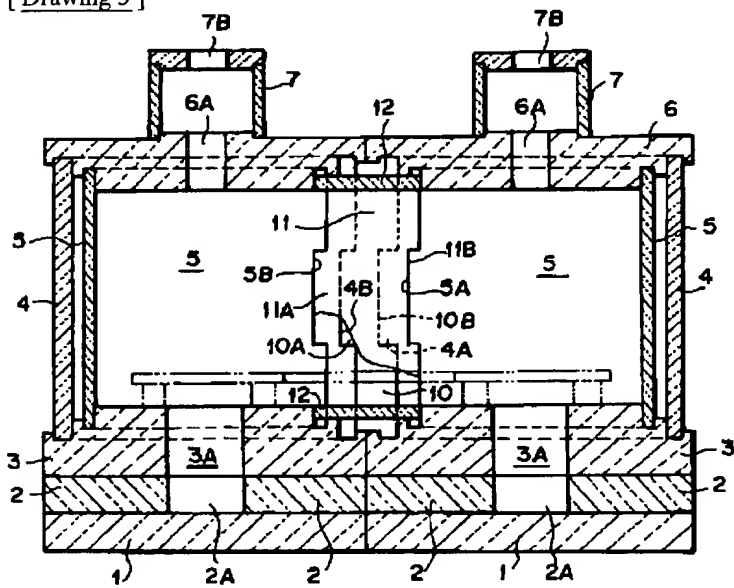


[ Drawing 4 ]





[ Drawing 5 ]



[Translation done.]